

# Restoring *Oncorhynchus mykiss* in an Urbanized Environment





## Codornices Creek Watershed Restoration Action Plan

Urban Creeks Council  
Emma B.L. Gutzler

# Codornices Creek Watershed



**Codornices Creek Watershed Location**

-  Berkeley City Limits
  -  Codornices Creek
  -  Codornices Creek Watershed (approximate)
  -  San Francisco Bay
- Scale = 1" = 20,000'



# *Oncorhynchus mykiss*

## *Steelhead/Rainbow Trout*



- Mid- 1990's anecdotal reports
- 1999 electrofishing confirmed presence
- 2004 restoration project relocated 127 *O. mykiss*

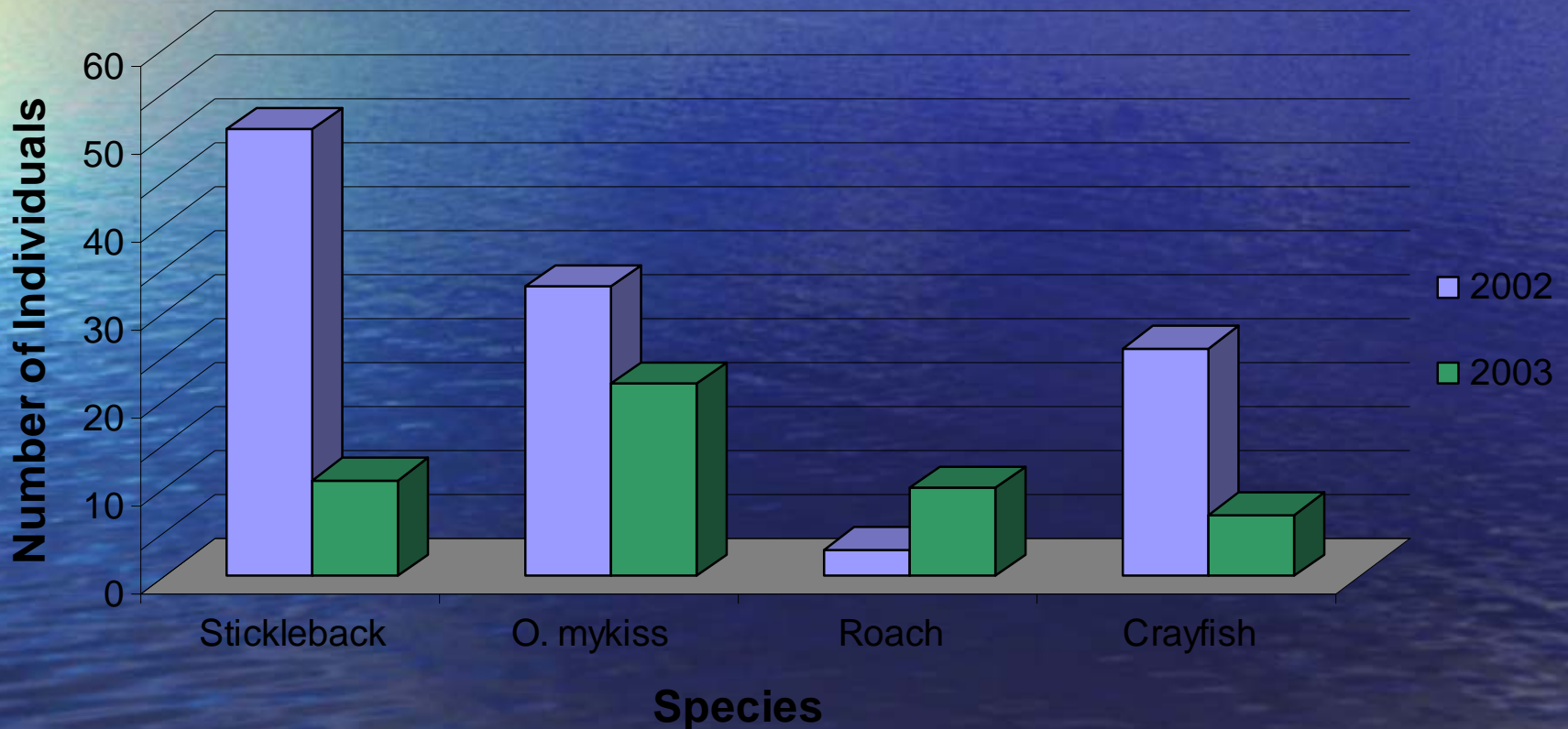


# Codornices Creek Watershed Restoration Action Plan CCWRAP

- Goal – Restore stream habitat and steelhead population
- Grass-roots beginning – 2000
- Funding – California Bay-Delta Authority Watershed Program Prop. 13
- Evaluation – Fish Population  
Stream Habitat  
Salmonid Migration Barriers  
Water Quality

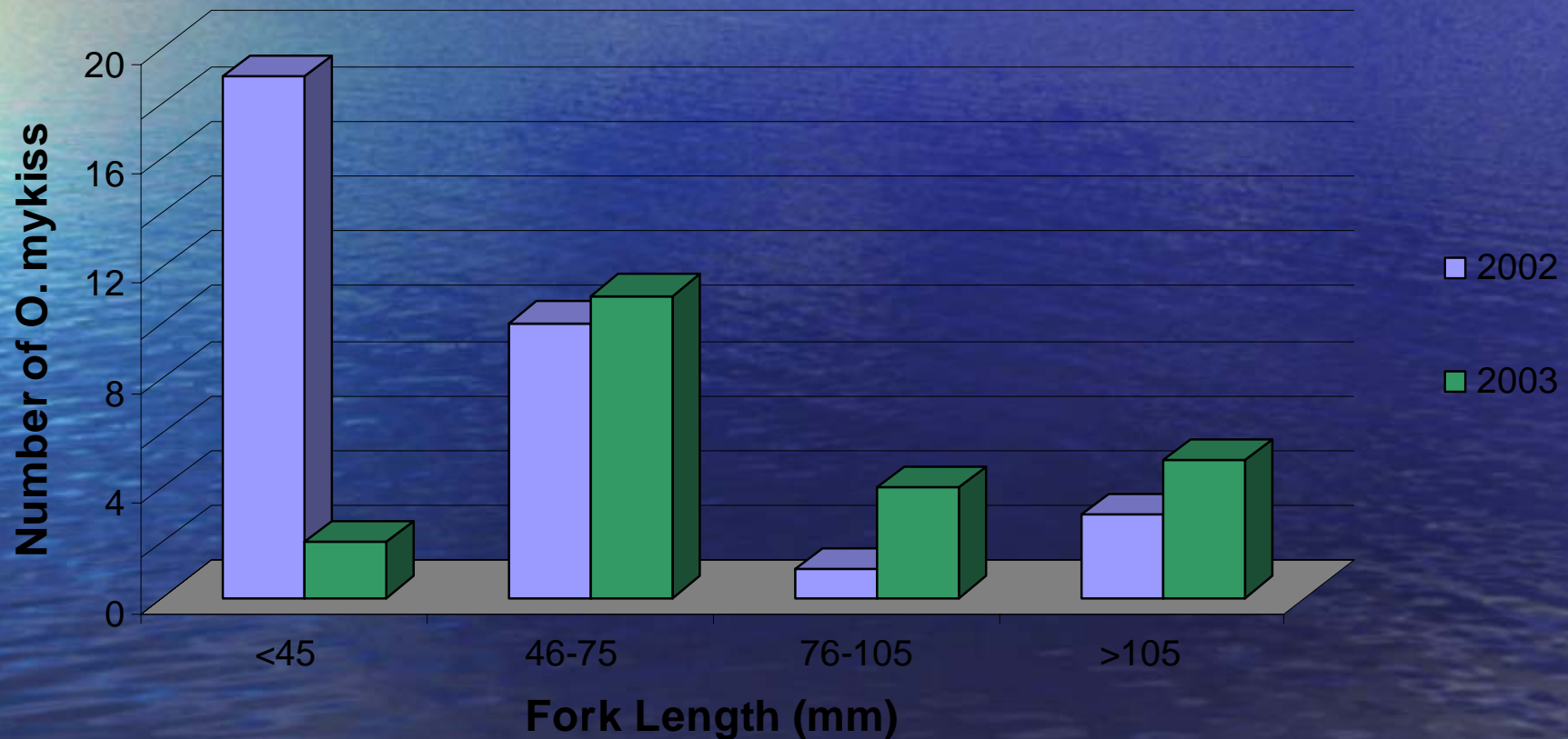
# CCWRAP – Fish Population

## Downstream Migrant Trap Codornices Creek



# CCWRAP – Fish Population

Downstream Migrant Trap *O. mykiss*  
Size Range Codornices Creek





# CCWRAP – Fish Population

## What we learned...

Codornices has a self-sustaining, albeit small population of *O. mykiss*.

Salmonids successfully spawned in 2002 and 2003.





# CCWRAP – Stream Habitat

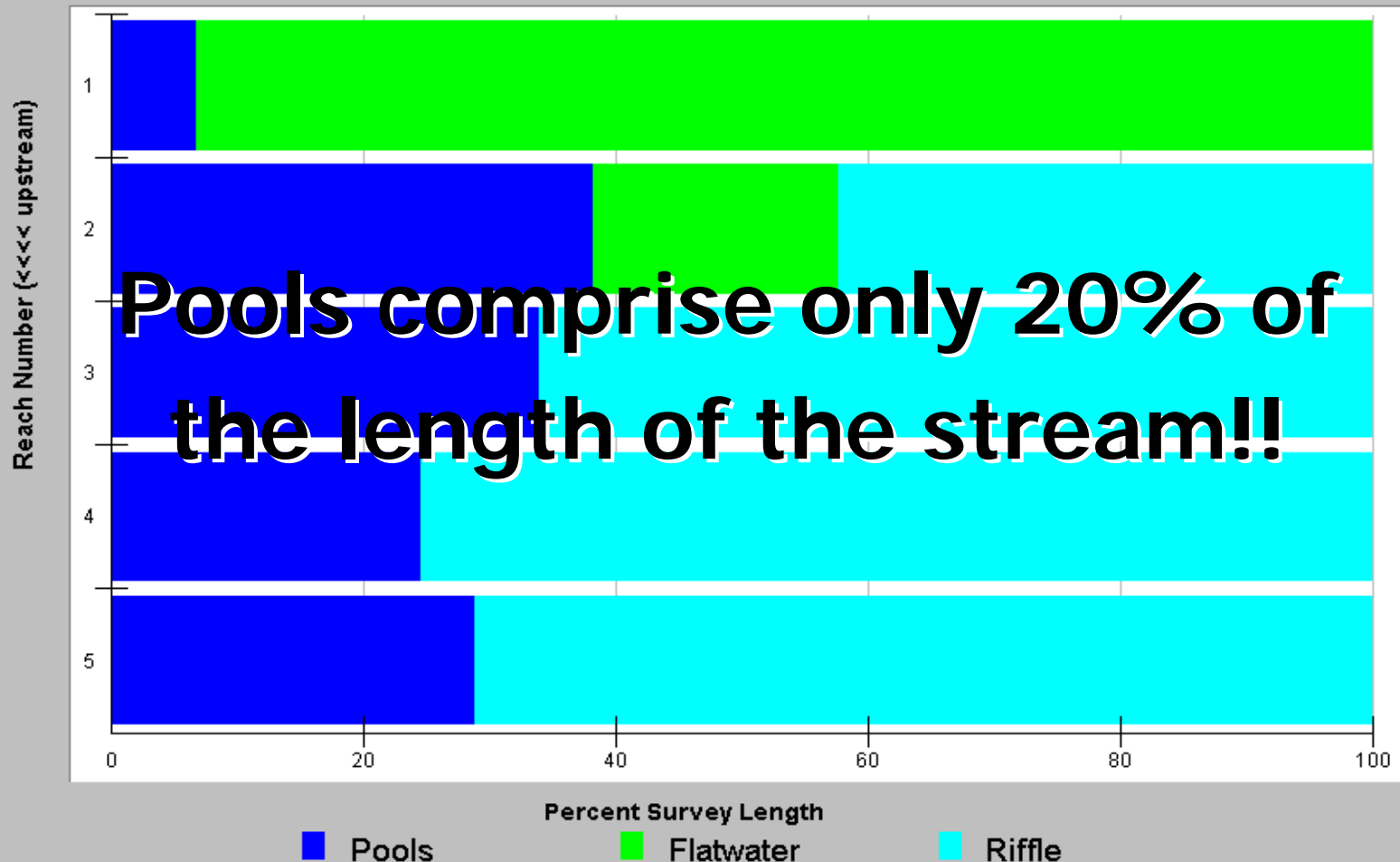
- Pools
- Erosion Sites
- Spawning Gravel





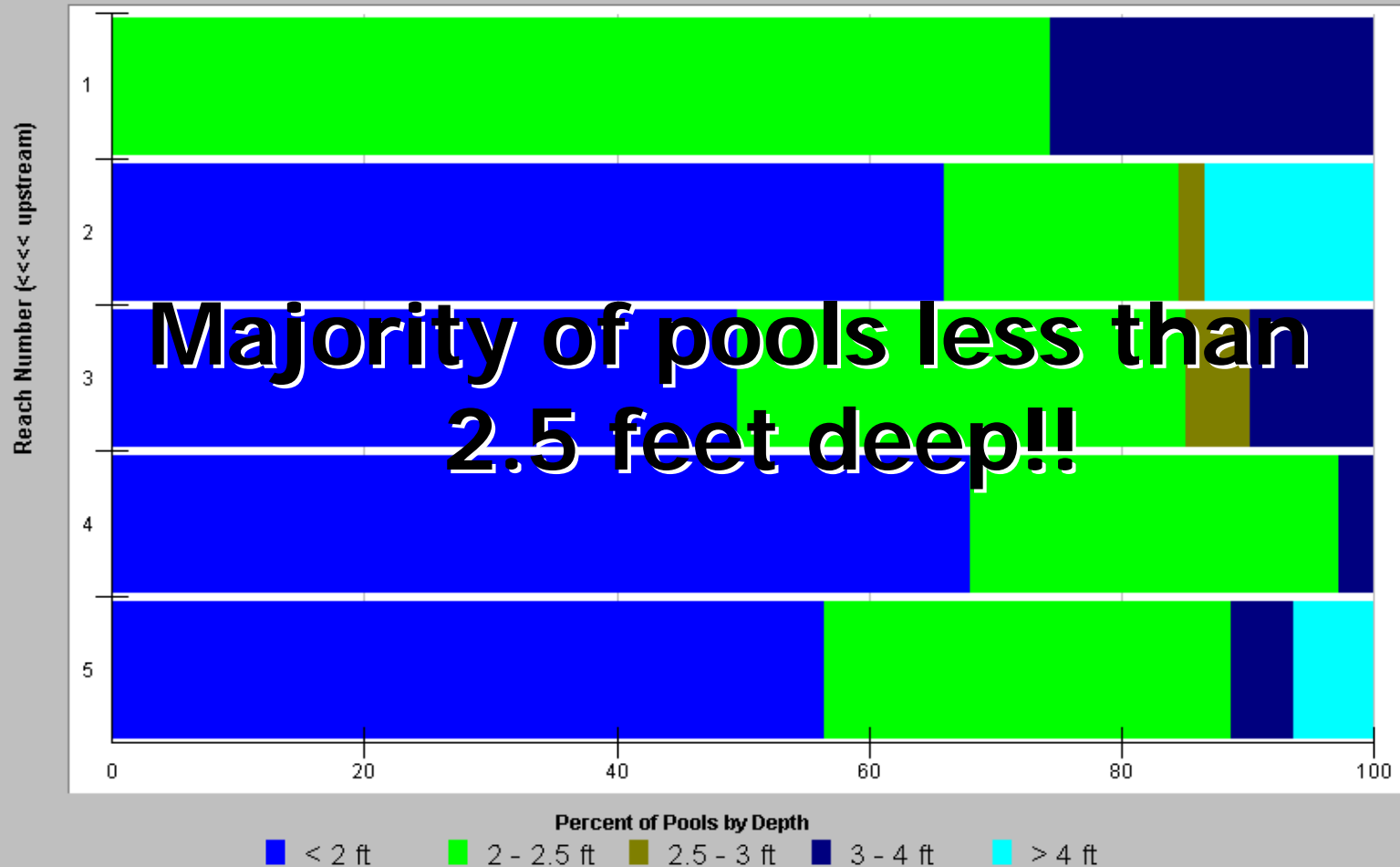
# CCWRAP – Stream Habitat

Habitat Type by Length for Codornices Creek 2003



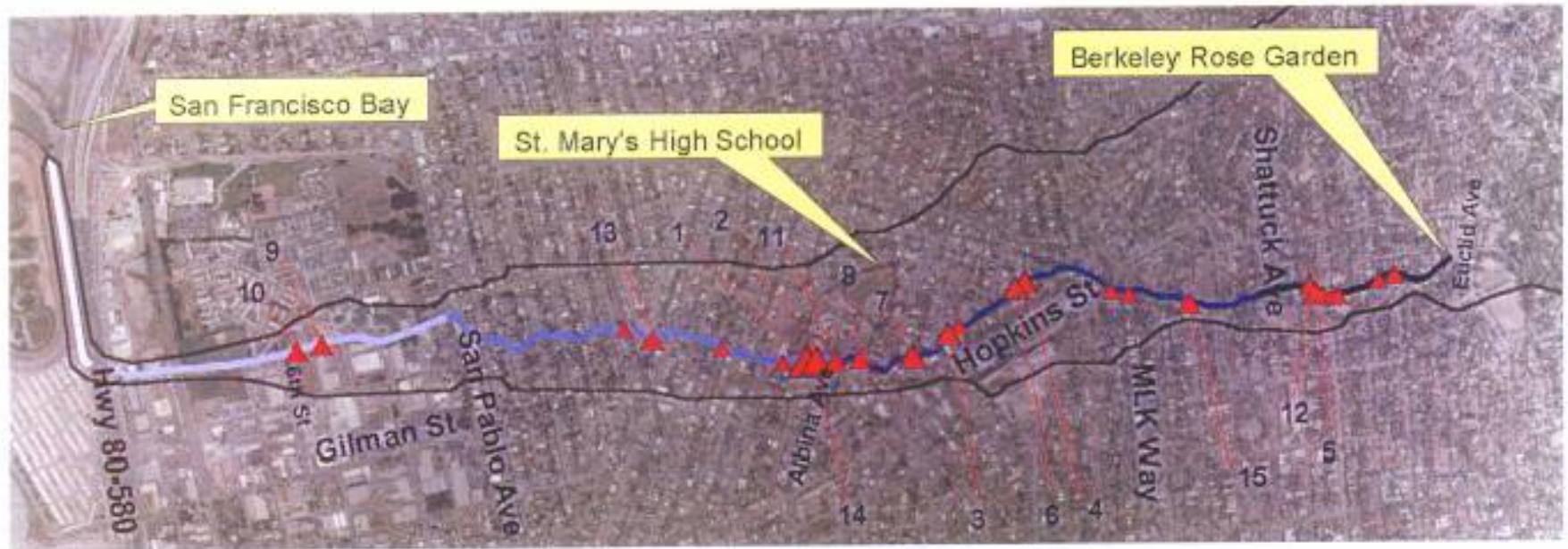
# CCWRAP – Stream Habitat

Maximum Pool Depths by Length for Codornices Creek 2003

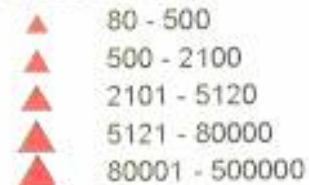





# CCWRAP – Stream Habitat



Erosion Sites (volume in cubic ft.)



 Codornices Creek Watershed (approximate)

Codornices Creek Study Reaches



Scale = 1:30,000

## Codornices Creek Erosion Site Locations

1000 0 1000 2000 Feet



# CCWRAP – Stream Habitat

## What we learned...

13 of the 15 erosion site identified in this study were identified as priority erosion sites in a 1990 study.

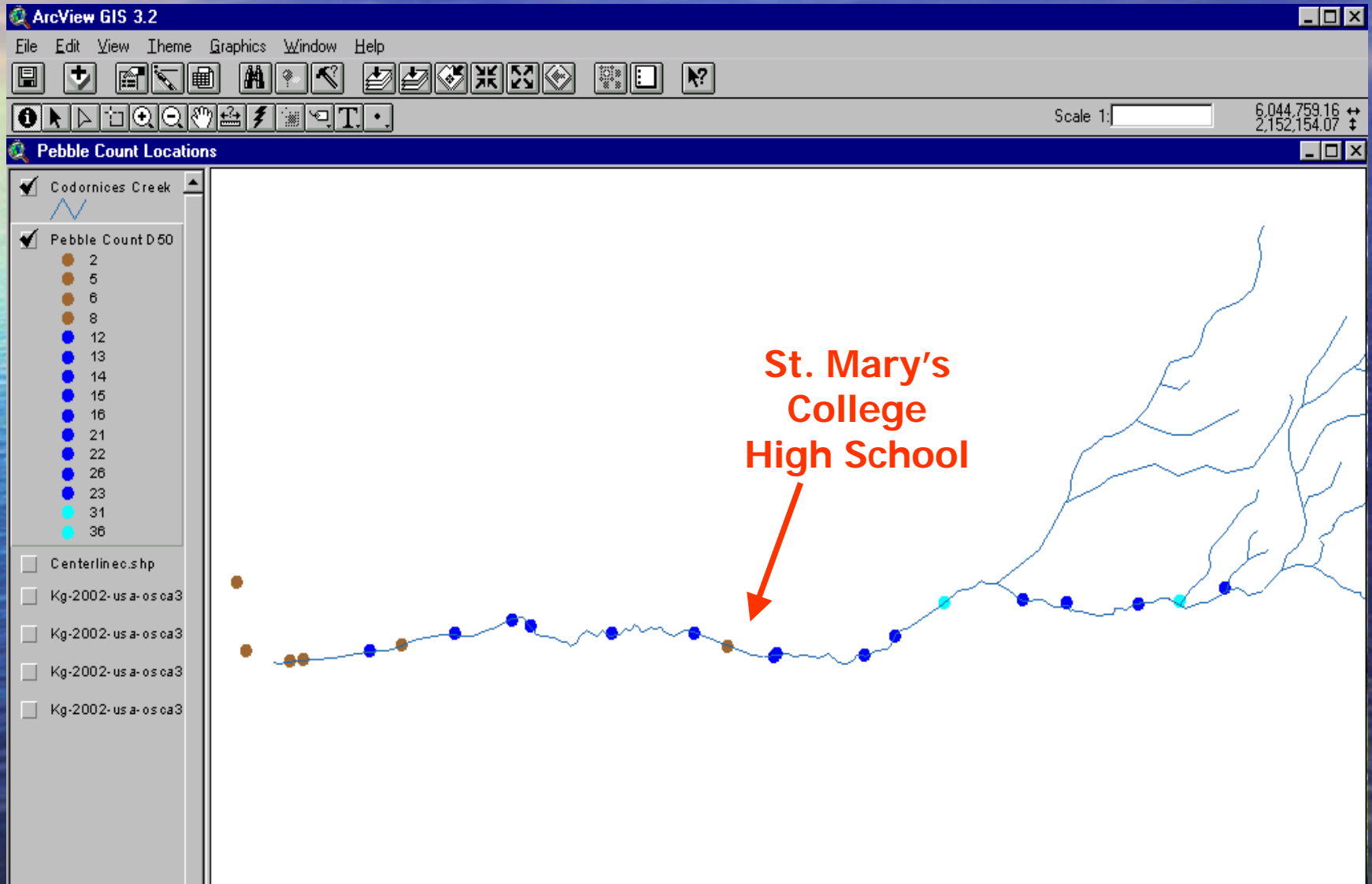
Three of the largest erosion sites occur along St. Mary's College High School.



# CCWRAP – Stream Habitat

- Median Particle Size
  - Streambed particle sizes for successful steelhead spawning, egg incubation and fry emergence range from 10-45 mm (Kondolf 1993)
- Embeddedness
  - 25% or less is considered suitable for salmonid spawning (CDFG 1998)

# CCWRAP – Stream Habitat





# CCWRAP– Stream Habitat

## What we learned...

Streambank erosion occurring at St. Mary's College High School appears to be adversely affecting downstream spawning gravel and embeddedness.





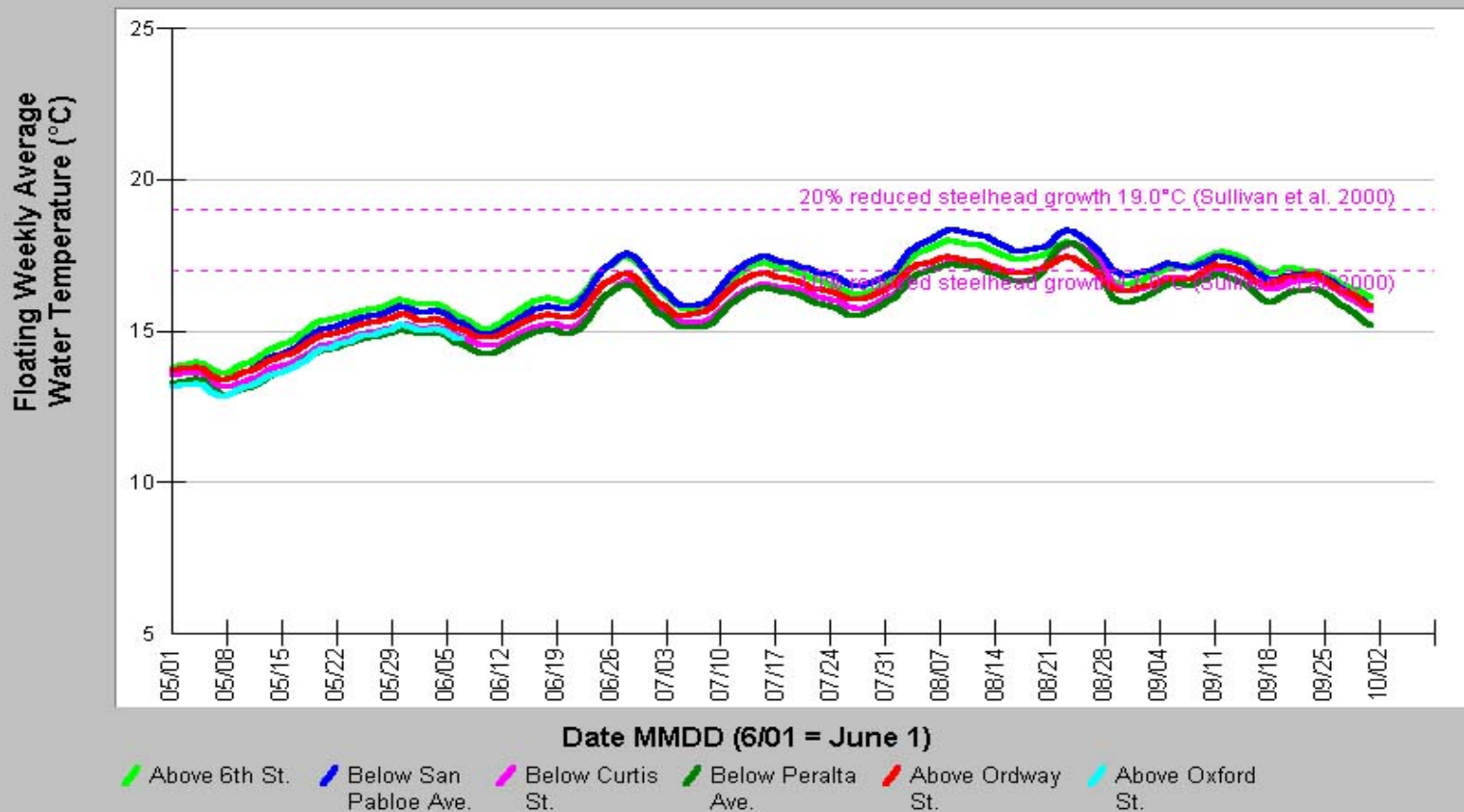
# CCWRAP – Migration Barriers



# Water Quality – Temperature

## CCWRAP

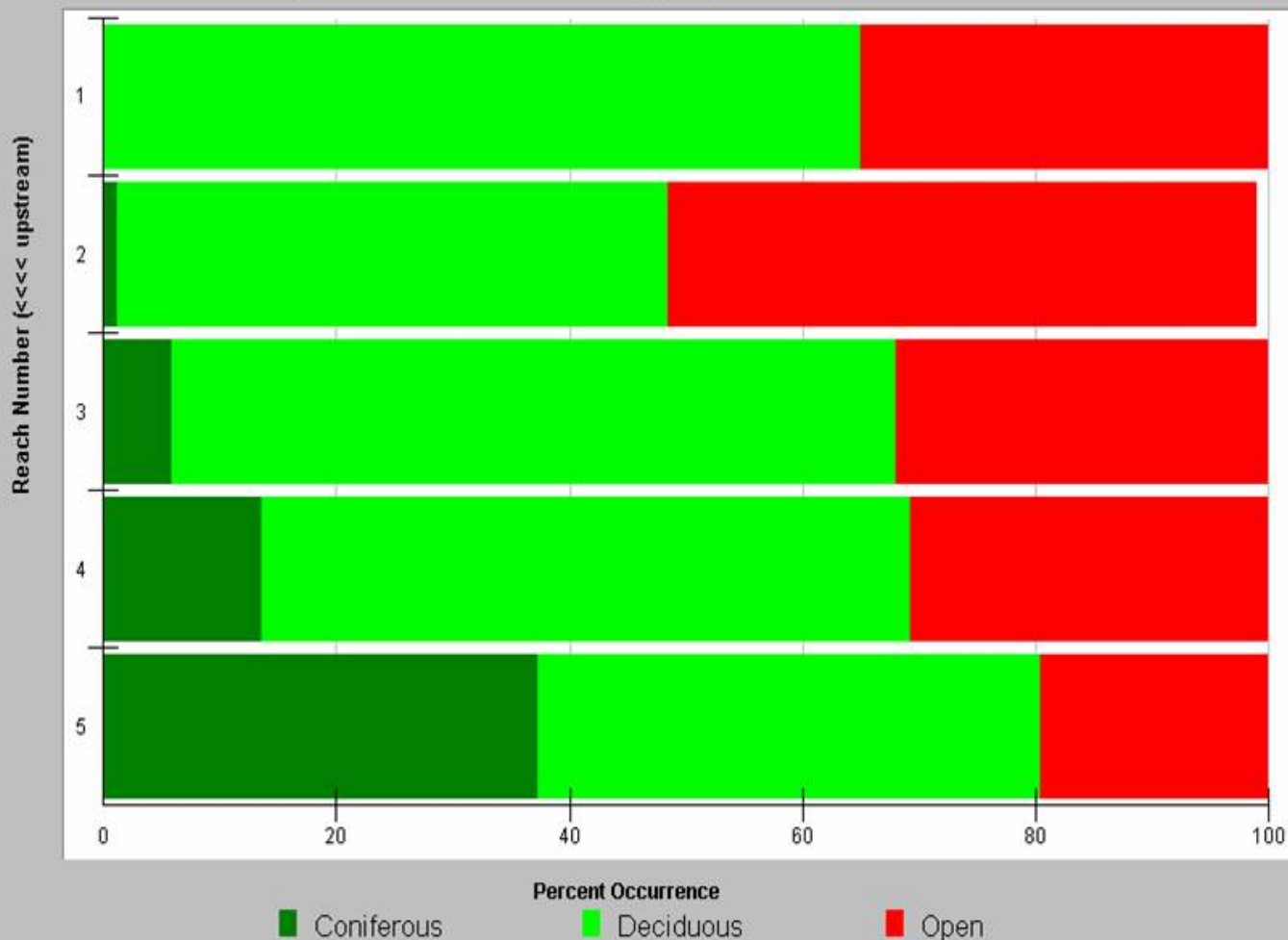
Floating Weekly Average Temperature at Codornices Creek Sites  
2003



# Water Quality – Cover

## CCWRAP

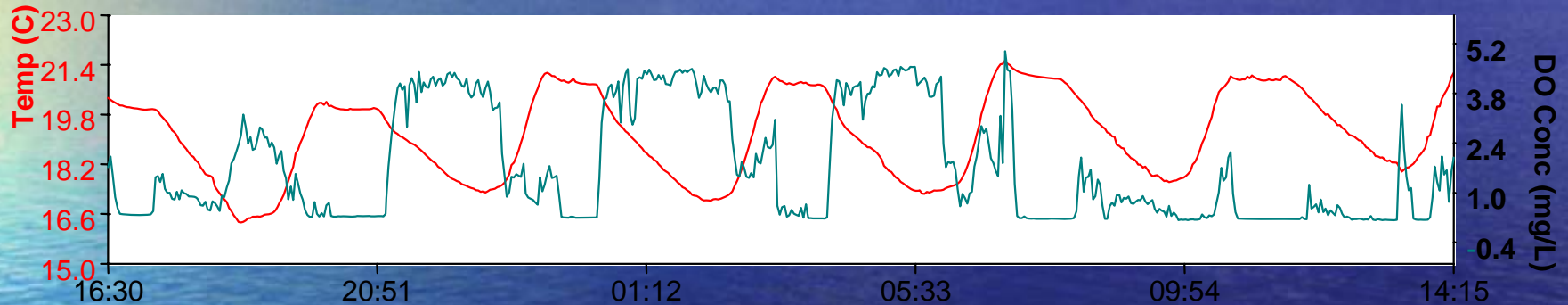
Canopy Cover from Habitat Typing of Codornices Creek 2003



# Water Quality – DO SWAMP

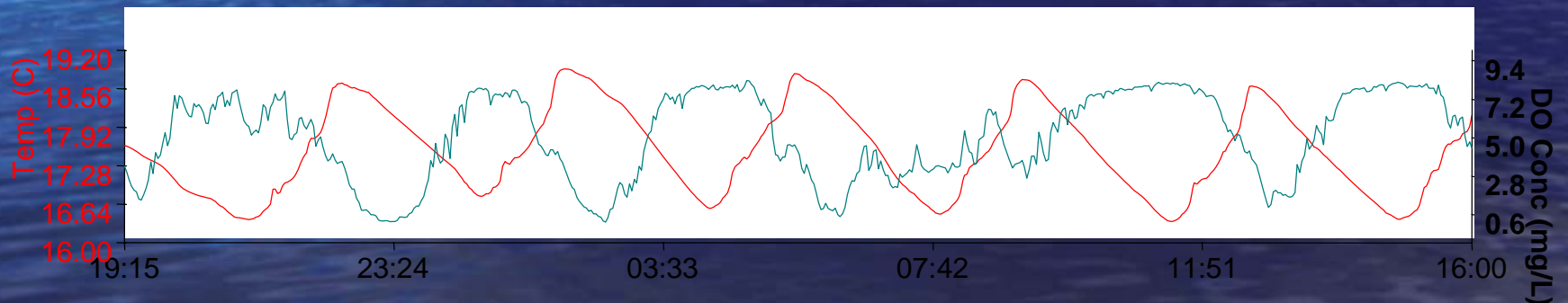
**COD020 Codornices @ 2nd St**

September 3 - 9, 2004



**COD080 Codornices @ Albina**

September 3 -9, 2004

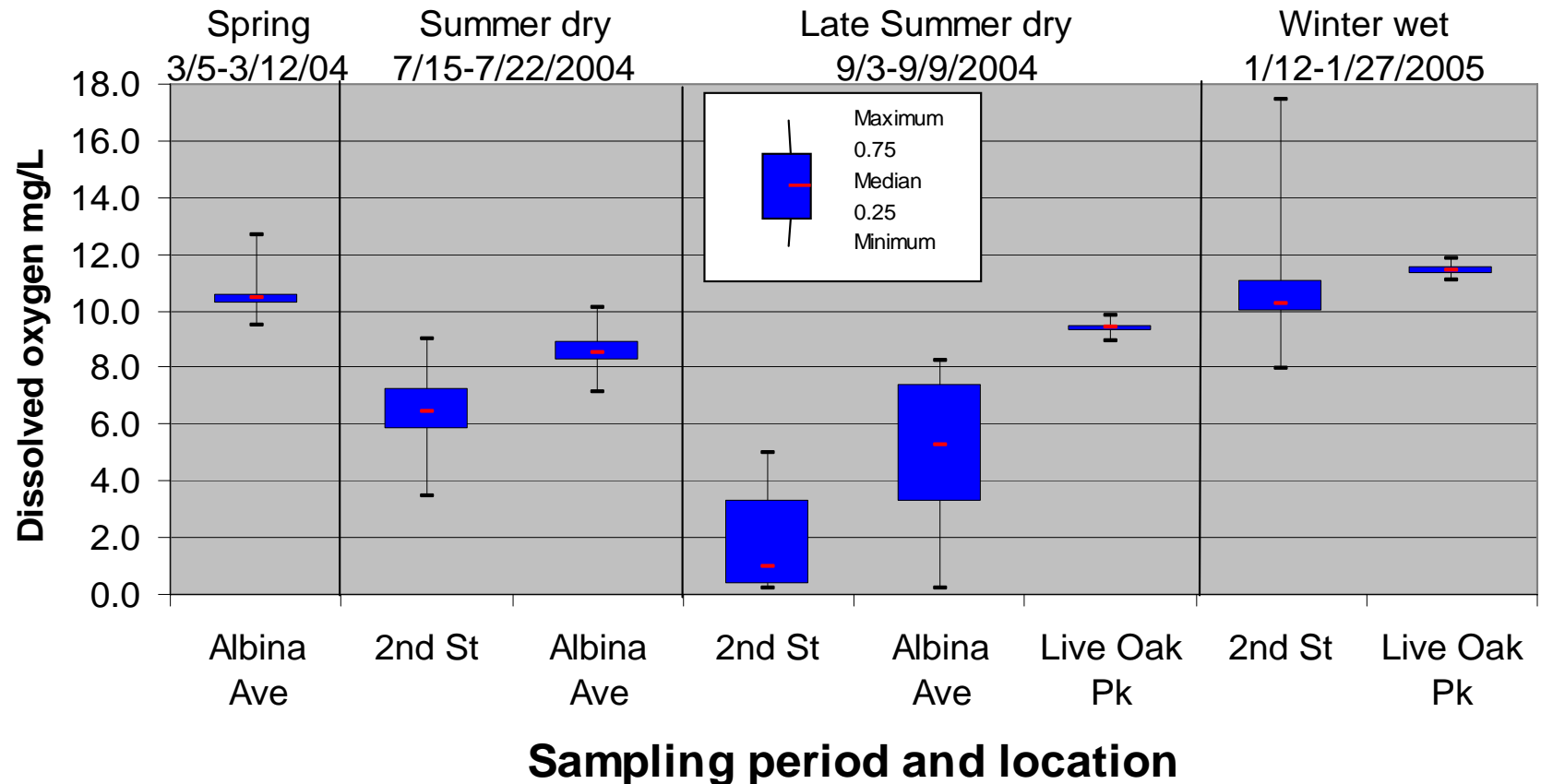


**Data displayed is still undergoing validation.**



# Water Quality – DO SWAMP

## Codornices Creek temporal variation in dissolved oxygen, mg/L



Data displayed is still undergoing validation.

# Water Quality – PAHs

## Polycyclic Aromatic Hydrocarbons

- Petroleum products, soot, and smoke
- bioaccumulate in invertebrates



**SWAMP 2005 – 8 PAHs above detection limits  
not in exceedence of criterion**

# CCWRAP –Water Quality

## What we learned...

Diazinon levels occasionally exceeded chronic and acute criteria

Copper levels occasionally exceed chronic criterion but not acute criterion

Dissolved Oxygen levels are low during the summer

Water temperatures are slightly high during the summer

Want to further examine PAHs in sediment and water



# So Now What?!?



## Put the plan to action within the community!!

# Education



- Watershed Festivals
- Storm Drain Stenciling
- Brochures
- Volunteer Monitoring
- School Groups  
Elementary – University





# Watershed Council



- A collaborative, multi-stakeholder group
- Diverse interests
- Watershed approach to managing natural resources



# Streambank Stabilization

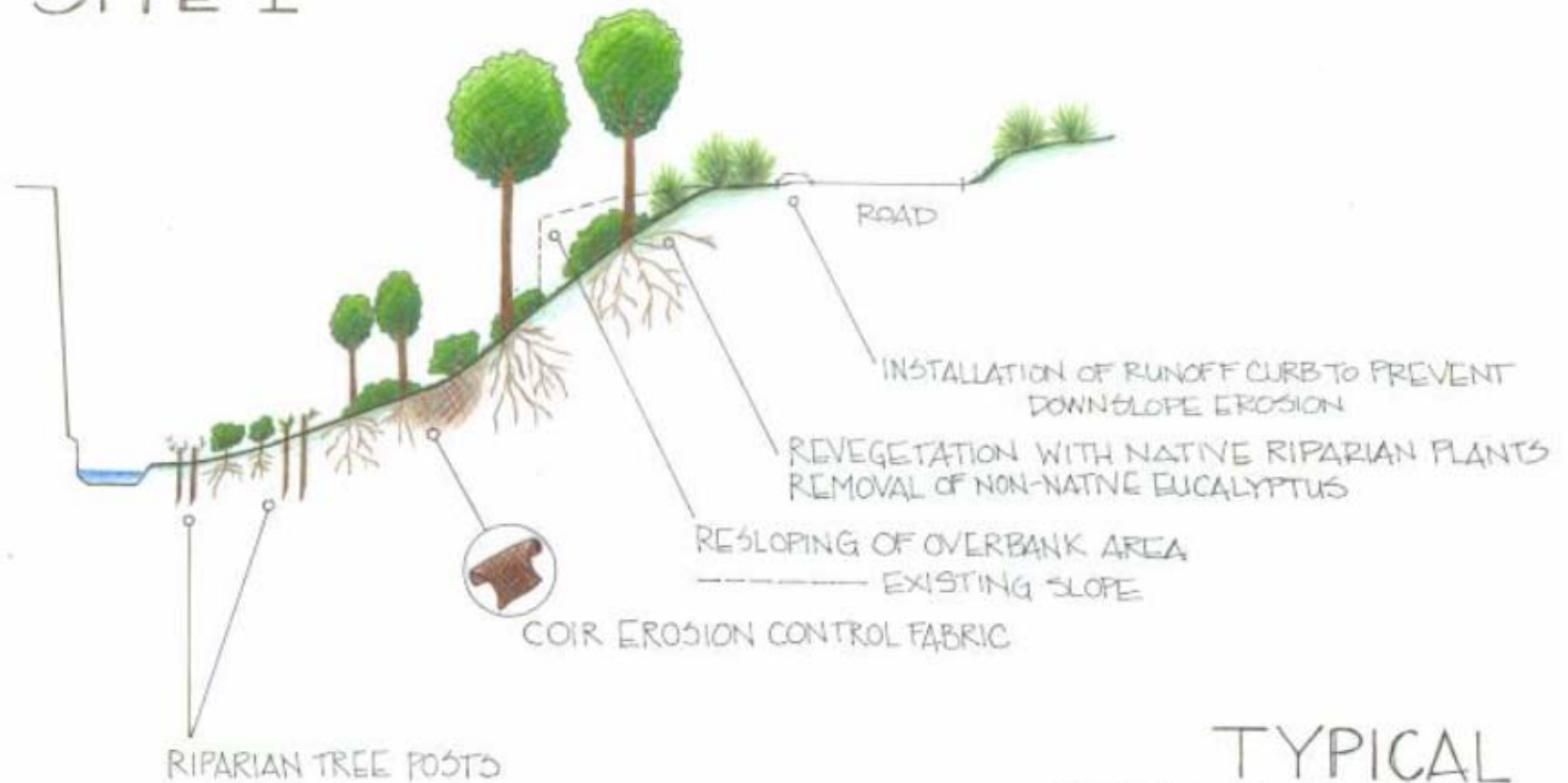








# SITE 1



1"  
10'  
SCALE

## TYPICAL CROSS SECTION

CODORNICES CREEK  
AT SAINT MARY'S  
COLLEGE HIGH SCHOOL



URBAN CREEKS COUNCIL  
BY: KJV

# Backyard Demonstration Projects

- Removal of Invasive Vegetation
- Revegetation with Native Riparian Species
- Small Erosion Control Projects
- Runoff Control





# Backyard Demonstration Projects





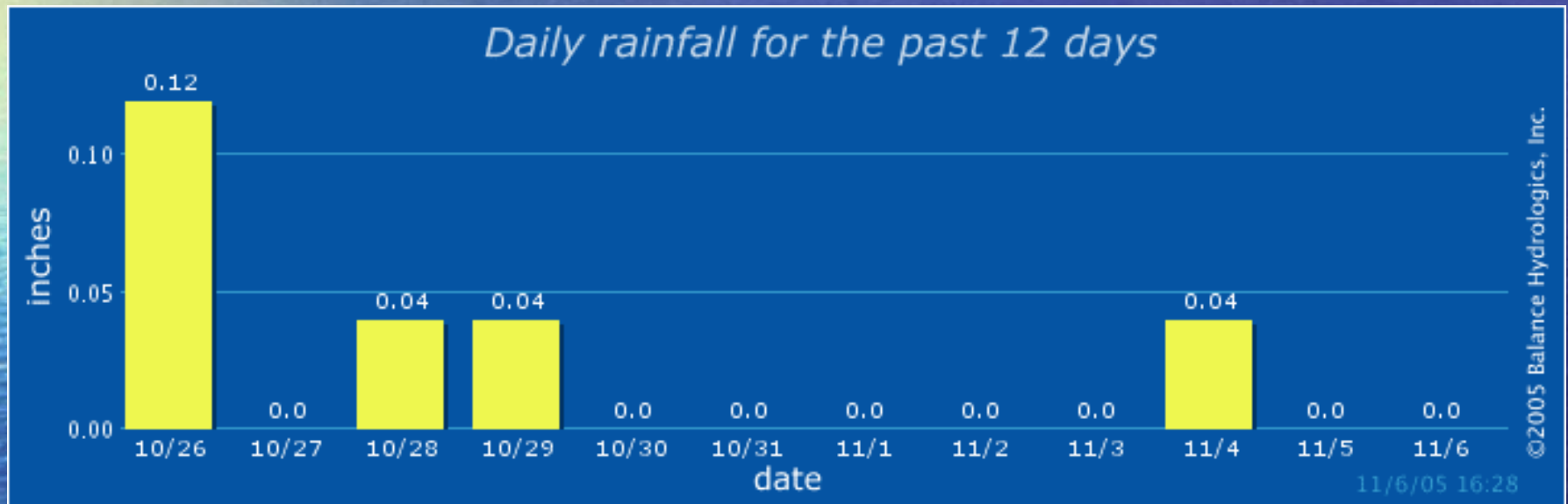
# Continued Monitoring

- Water quality
  - Conventional (T, DO, pH, conductivity)
  - PAHs and First Flush events
  - Live stream gage data

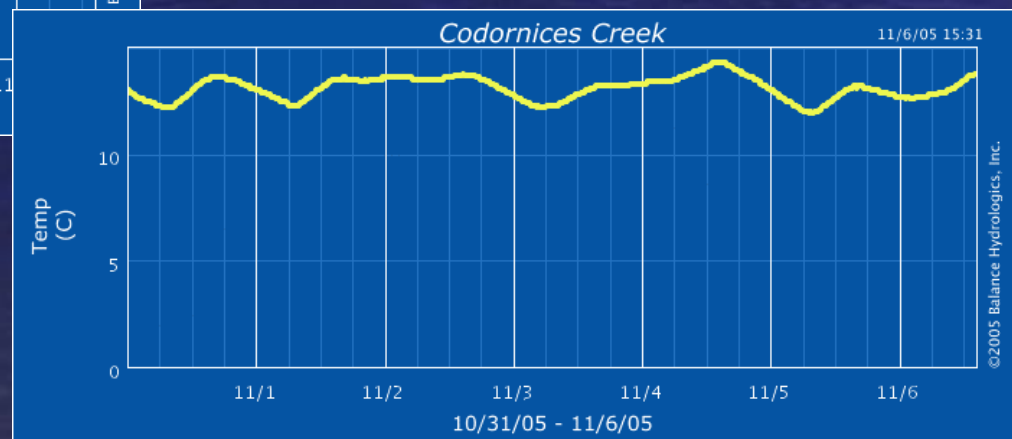
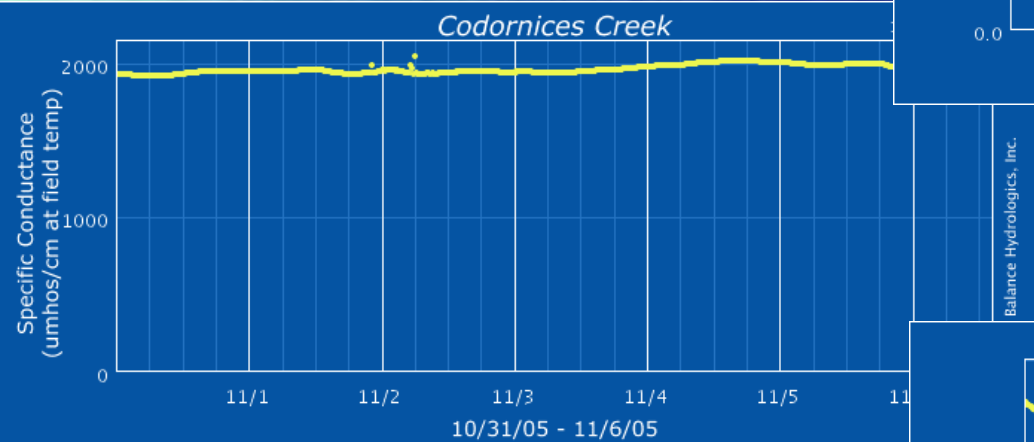
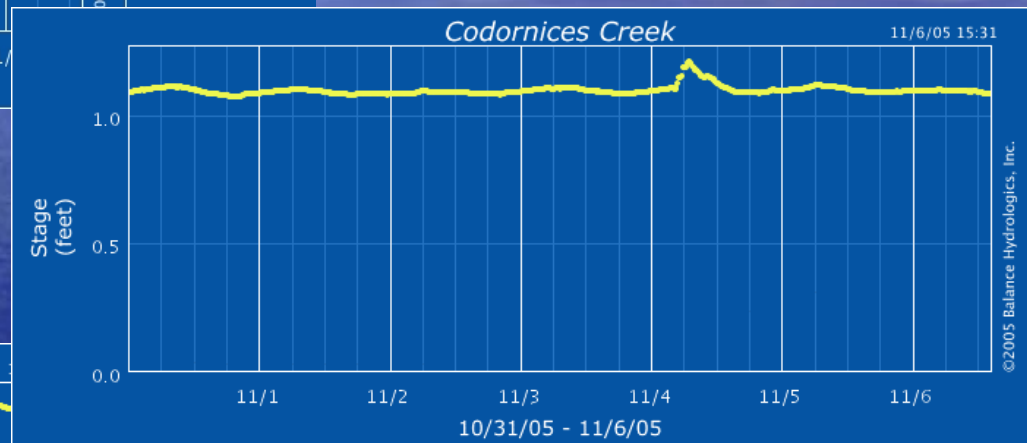
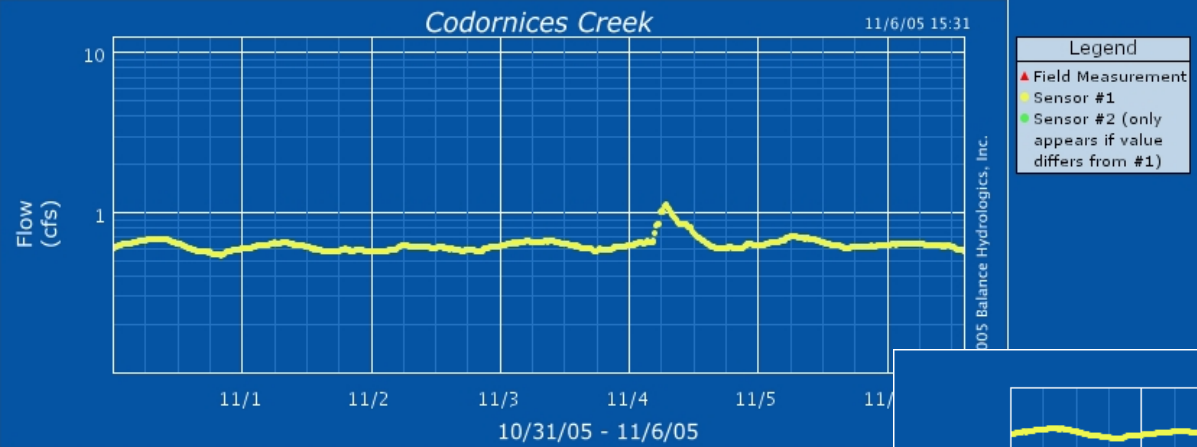




# Continued Monitoring



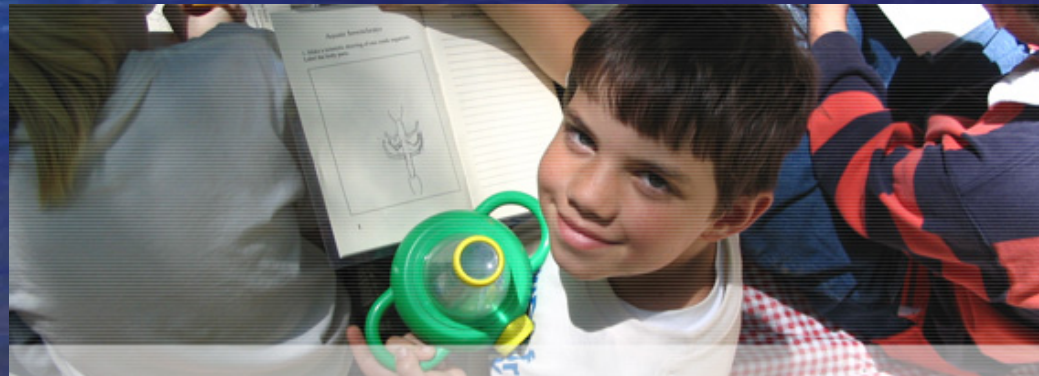
<http://www.balancehydrologics.com/codornices/creek/index.php>





# Continued Monitoring

- Stream Habitat
  - $V^*$  -- residual pool depth
  - Mean particle size
  - Macrobenthic



# Continued Monitoring

- Fish Population
  - Quantitative population and distribution
  - Electrofishing
  - Spawning Surveys
  - Outmigrant Trapping





**"Are the fish safe to EAT?! Heck, yeah!  
Me and Leon been eatin' 'em for 30 years!"**



Thank you for your interest

Questions?

Protect your watershed!